

CLAIMS

What is claimed is:

1. A wide angle display system, comprising:
 - a linear array projector, configured to project an image along an optical axis;
 - 5 a curved display surface;
 - a substantially planar scanning mirror, defining a plane, disposed along the optical axis, configured to continuously rotate about a rotational axis that is substantially in the plane of the mirror, and to reflect the image onto the display surface.
- 10 2. A wide angle display system in accordance with claim 1, wherein the scanning mirror comprises two substantially planar, opposite reflective sides.
- 15 3. A wide angle display system in accordance with claim 2, wherein the linear array projector comprises two linear array projectors, the projectors being configured to project an image from opposing sides of the scanning mirror toward a point of convergence substantially at the location of the scanning mirror, the scanning mirror being configured to reflect the image from each projector onto the display surface.
- 20 4. A wide angle display system in accordance with claim 3, wherein the display system is configured to project an image upon the curved display surface across a circular arc of 360 degrees.
- 25 5. A wide angle display system in accordance with claim 1, wherein the projector has a refresh rate, and the scanning mirror is configured to rotate at a speed that is one half the refresh rate.
- 30 6. A wide angle display system in accordance with claim 1, wherein the linear array projector is configured to project an array of pixels that is substantially parallel to the rotational axis.
7. A wide angle display system in accordance with claim 1, wherein the optical axis is oblique to the rotational axis of the scanning mirror.

8. A wide angle display system in accordance with claim 1, further comprising a substantially planar folding mirror, disposed along the optical axis, having an axis substantially parallel to the axis of the scanning mirror, configured to reflect the image to the scanning mirror.

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9. A wide angle display system in accordance with claim 8, wherein the folding mirror is configured to oscillate about its axis, so as to increase a field of projection of the image.

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10. A wide angle display system in accordance with claim 1, wherein the display surface comprises an axis of curvature that is substantially parallel to the rotational axis of the scanning mirror.

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11. A wide angle display system in accordance with claim 10, wherein the axis of curvature of the display is substantially collinear with the rotational axis of the scanning mirror.

12. A wide angle display system in accordance with claim 1, wherein the image is projected upon the curved display surface across a circular arc of more than 90 degrees.

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13. A wide angle display system in accordance with claim 12, wherein the image is projected upon the curved display surface across an arc of approximately 270 degrees.

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14. A wide angle display system in accordance with claim 1, wherein the image is viewable on a concave side of the display surface.

15. A wide angle display system in accordance with claim 1, wherein the image is viewable on a convex side of the display surface.

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16. A wide angle display system, comprising:
a linear array projector, configured to project an image comprising a series of lines of pixels;
a folding mirror, configured to reflect the image toward a scanning mirror;

a scanning mirror, having two parallel, substantially planar, opposing reflective sides, and a rotational axis that is parallel to the opposing reflective sides and parallel to the lines of pixels, configured to continuously rotate about the rotational axis, so as to reflect the lines of pixels onto and scan the image across a curved display surface.

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17. A wide angle display system in accordance with claim 16, wherein the lines of pixels comprise vertical lines, and the image is scanned horizontally across the screen.

10 18. A wide angle display system in accordance with claim 16, wherein the rotational axis is substantially collinear with a focal axis of the display surface.

19. A wide angle display system in accordance with claim 16, wherein the scanning mirror is disposed above a viewer location.

15 20. A wide angle display system in accordance with claim 16, wherein the display surface is a double-curved surface.

21. A wide angle display system in accordance with claim 16, wherein the linear array projector comprises a grating light valve.

20 22. A wide angle display system in accordance with claim 16, wherein the folding mirror further comprises:

25 a reflective surface defining a plane;
an axis that is substantially parallel to the plane and substantially parallel to the lines of pixels, the folding mirror being configured to oscillate about the axis, so as to widen the field of projection of the image.

30 23. A wide angle display system in accordance with claim 16, wherein the projector produces the lines of pixels at a refresh rate, and the scanning mirror is configured to rotate at a speed that is one half the refresh rate.

24. A wide angle display system, comprising:
a curved display surface, having a center of curvature;

a linear array projector, configured to project an image comprising a series of lines of pixels;

5 a folding mirror, configured to reflect the image toward a scanning mirror;
a scanning mirror, having two parallel, substantially planar, opposing reflective sides,
and a rotational axis that is parallel to the opposing reflective sides and collinear with the
center of curvature, configured to continuously rotate about the rotational axis, so as to reflect
the lines of pixels onto and scan the image across the display surface.

25. A method for projecting a panoramic image, comprising the steps of:

10 a) continuously rotating a scanning mirror about a rotational axis that is
substantially parallel to a center of curvature of a curved display screen; and
b) projecting an image onto the scanning mirror, using a grating light valve
projector, the image comprising lines of pixels substantially parallel to the rotational
axis, so as to reflect the image onto the curved display screen.

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26. A method in accordance with claim 25, further comprising the step of:

c) projecting the image onto a folding mirror which reflects the image to the
scanning mirror.

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27. A method in accordance with claim 26, further comprising the step of:

d) oscillating the folding mirror about an axis that is substantially parallel to
the rotational axis of the scanning mirror, so as to increase a field of projection of the
image.

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28. A method in accordance with claim 25, wherein the step of continuously rotating
the scanning mirror comprises rotating the scanning mirror at a frequency that is one half a
refresh rate of the projector, so as to project the image onto two substantially planar, parallel,
opposing reflective sides of the scanning mirror.

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29. A wide angle display system, comprising:

at least two linear array projectors, each projector configured to project an image
comprising a vertical line of pixels, and to project the image along a unique optical axis
toward a point of convergence;
a curved display surface;

a scanning mirror, disposed substantially at the point of convergence, having at least two substantially planar vertical reflective sides, configured to continuously rotate about a vertical axis, and to reflect the image from each projector onto the display surface.

5 30. A wide angle display system in accordance with claim 29, wherein the at least two linear array projectors comprise two linear array projectors, and the scanning mirror comprises a substantially planar body having two opposite reflective vertical sides.

10 31. A wide angle display system in accordance with claim 30, wherein the two linear array projectors are substantially directly oppositely disposed relative to the scanning mirror, and each projector is configured to project an image onto approximately one half of a 360 degree curved screen.

15 32. A wide angle display system in accordance with claim 29, wherein the scanning mirror comprises a polygonal body having a number of reflective vertical sides equal to a number of linear array projectors.

20 33. A wide angle display system in accordance with claim 32, wherein each linear array projector is configured to project an image onto a different portion of a 360 degree curved screen.

34. A wide angle display system in accordance with claim 29, wherein the center of curvature of the display surface is substantially vertical, and the vertical axis of the scanning mirror is substantially collinear with the center of curvature of the display surface.